

## **Chemical contaminants and ESA-listed Salmon in the Lower Columbia River**

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To better understand the dynamics of contaminant uptake and its effects on outmigrant juvenile salmon, NOAA Fisheries and the Army Corps of Engineers have initiated a pilot study to measure contaminant concentrations and health effects in outmigrating juvenile salmon in the Columbia River. In 2000-2002, tissue and stomach contents for chemical analysis were collected from juvenile Chinook salmon from near the confluence of the Columbia and Willamette Rivers, near Kalama, and at several sites within the Lower Columbia Estuary (White Island, West Sand Island, between East and West Sand Island, Chinook Point, East Trestle Bay, West Trestle Bay, Lower Desdemona Sands, and Middle Desdemona Sands). Tissue samples were collected for several fish health indicators (activity of toxicant metabolizing enzymes, DNA damage, growth rate, and immune function) and fin clips were collected for genetic analyses to identify the stock and site of origin of sampled fish. Chemical analyses have been completed on stomach contents and whole body samples of Chinook salmon from the Willamette/Columbia Confluence, Kalama/Longview, White Island, and West Sand Island. DDTs, PCBs, and PAHs were found in stomach contents of fish from all sites, with highest concentrations in fish from the Willamette/Columbia confluence. The main contaminants in salmon bodies were PCBs and DDTs. Average concentrations of PCBs in whole body composites ranged from 23 to 41 ng/g wet wt (1300 to 2800 ng/g lipid), in some cases exceeding the NOAA Fisheries' estimated threshold for adverse health effects of 2400 ng/g lipid. Average DDT concentrations ranged from 32 to 39 ng/g wet wt (1800 to 2600 ng/g lipid), among the highest levels observed in juvenile salmon from Pacific Northwest estuaries. Concentrations of PCBs and DDTs in salmon whole bodies were not highly correlated with concentrations in their food at the time of sampling, and were as high in fish sampled near the mouth of the Columbia as at the confluence. Relatively high concentrations of PCBs and DDTs were found in fish sampled from hatcheries, suggesting that this could be an important source of contamination in samples from mixed stock populations. An ELISA method is currently under development to determine the ability of salmon collected from the Willamette/Columbia Confluence, Kalama/Longview, and West Sand Island in 2002 to generate an immune response. This will allow us to monitor the plasma antibody response of individual fish to indigenous bacteria.